



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

Report Nos.: 50-269/84-24, 50-270/84-23, and 50-287/84-25

Licensee: Duke Power Company
422 South Church Street
Charlotte, NC 28242

Docket Nos.: 50-269, 50-270, and 50-287

License Nos.: DPR-38, DPR-47, and
DPR-55

Facility Name: Oconee 1, 2, and 3

Inspection Conducted: September 24-28, 1984

Inspector: *J. J. Blake*
for W. J. Ross

10/17/84
Date Signed

Approved by: *J. J. Blake*
Jerome J. Blake, Section Chief
Engineering Branch
Division of Reactor Safety

10/17/84
Date Signed

SUMMARY

Scope: This routine, unannounced inspection entailed 43 inspector-hours on site in the areas of plant chemistry and inservice testing of pumps and valves.

Results: No violations or deviations were identified.

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REPORT DETAILS

1. Licensee Employees Contacted

- *M. S. Tuckman, Station Manager
- J. J. Sevic, Station Chemist
- L. T. Benze, Chemistry Coordinator
- J. D. Bivins, Secondary Supervisor - Chemistry
- J. W. Crain, Environmental Supervisor - Chemistry
- C. W. Hendriks, Engineer - Duke Power Company
- *P. A. Hull, Associate Chemist - Chemistry
- B. K. Jones, Staff Coordinator - Chemistry
- E. L. Jackson, Engineer, Project Services
- *H. R. Lowery, Operating Engineer - Operations
- *T. C. Matthews, Technical Specialist - Compliance
- W. Morgan, Operations Supervisor - Operations
- K. Rohde, Performance Engineer - Performance
- T. Stevens, Relief Shift Supervisor, Chemistry

Other Organization

H. Williams, Babcock and Wilcox Company

NRC Resident Inspectors

- *J. C. Bryant
- *L. King
- *K. Sasser

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on September 28, 1984, with those persons indicated in paragraph 1 above. The licensee acknowledged the findings with no dissenting comments.

Inspector Followup Item 270/84-23-01 Chemical Cleaning of Oconee Unit 2 Steam Generators - paragraph 5a.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Plant Chemistry (92706)

a. Steam Generator Cleanup

The inspector reviewed the condition of the once-through-steam-generators (OTSGs) in the three Oconee Units relative to: buildup of sludge within the steam generators; removal of the sludge; and the effect of the sludge on the integrity of the Inconel-600 steam generator tubes.

The inspector was informed that the pressure drop within the OTSGs in Units 1 and 2, and also in Unit 3 to a lesser extent, was continually increasing because of sludge buildup in the holes of the broached tube support plates. The licensee predicts that continued buildup of sludge in Unit 2 will force a reduction in maximum power within a period of a year unless the sludge is removed. The inspector was also informed that the technique that was used to remove sludge from Unit 2 during the October 1983 outage (see Inspection Report Nos. 50-269/83-32, 50-270/83-32, and 50-287/83-32 dated November 25, 1983) had not been successful, inasmuch as less than 100 pounds of sludge had been removed from the two OTSGs of this Unit. The licensee estimates that each OTSG still contains in excess of 1000 pounds of sludge.

Because of the difficulty involved with conventional sludge lancing techniques, the licensee is making preliminary plans to use a chemical cleaning process to remove the sludge before power reductions are necessary due to low water flow. The licensee is considering the use of a process that has been developed by the Electric Power Research Institute (EPRI) in association with the Steam Generators Owners Group (SGOG) and the U.S. Department of Energy and also by in-house research by Duke Power Company. The process consists of using a solution of a chelating agent ethylenediamine tetracetic acid (EDTA) to dissolve oxides of iron so that the iron can be flushed out of the OTSG. The licensee states that this process has been used successfully in fossil powered plants and in laboratory experiments as long as other chemicals were also added to inhibit the attack of EDTA on carbon steel structural components. However, tests by the licensee and by EPRI show that the conventional inhibitors, sulfur-containing organic compounds, initiate corrosion of Inconel-600 OTSG tubes. Therefore, attempts are being made to develop a more innocuous inhibitor. Also, chelates may not be disposed of as ordinary chemical waste; consequently, the licensee is developing alternative means for disposing of the large amount of EDTA that will be used in this process. At present, the licensee is not planning to initiate chemical cleaning before 1986. The licensee recognizes that, since chemical cleaning has not been performed on OTSGs in a nuclear plant and has the potential for degrading the primary coolant pressure boundary, such a unique program involves an unreviewed safety issue. Consequently, this subject will be considered as Inspector Followup Item 270/84-23-01, Chemical Cleaning of Oconee Unit 2 Steam Generators.

b. Chemistry Manual Update

Subsequent to its endorsement of the EPRI/SGOG guidelines for operating nuclear plants with OTSGs, the licensee initiated an update of all surveillance and control procedures relating to plant water chemistry. The inspector reviewed the current Chemistry Manual and verified that most of the elements in the Chemistry Program had been formalized in updated Administrative Practices and were being implemented as directed.

The inspector observed that the licensee had incorporated limits and action levels for secondary water chemistry control that are consistent with the EPRI/SGOG guidelines. These controls have not been included in Operating Procedures as directives for action to be taken by the Control Room Operators when abnormal secondary chemistry conditions occur. The licensee informed the inspector that the absence of a specific operating procedure relating to abnormal chemistry conditions is not considered to be a deficiency because the Operations Department recognizes the need for chemistry control and also understands the bases for recommendations made by the Chemistry Department as mandated in Administrative Practice 3.4, "Secondary System Corrective Action Guidelines."

The inspector recognizes that serious degradation of the condensate from inleakage or makeup is not likely because of the unusually high quality of the Lake Keowee water that is used for condenser cooling and in the water treatment plant. These favorable conditions provide greater flexibility for taking 'timely' action to protect the steam generators from abnormal chemistry conditions. The initial alert of significant degradation of the quality of condensate/feedwater will be provided to the Control Room Operators by an alarm that indicates high cation conductivity in the polisher effluent. The first indication of significant inleakage of air will be obtained when a recorder that monitors dissolved oxygen in the water in the hotwell is read by a chemistry technician. These recorders are on panels in the basement of the Turbine Building and are not continuously observed. In case of either type of contamination, the Control Room Operators will depend on the Chemistry Department to verify that an abnormal chemistry condition exists and to recommend the level of corrective action that should be taken.

The licensee informed the inspector that both Chemistry and Operations Departments monitor trends in key chemistry variables (especially silica) in an effort to prevent sudden, as well as long-term, degradation of the condensate/feedwater. However, the licensee will review further the subject of 'timely corrective action' in line with the EPRI/SGOG guidelines.

c. Transfer of Iron Oxides and Corrosive Chemicals to the OTSGs

The inspector reviewed the procedures that the licensee uses to minimize contamination of the feedwater through transport of soluble and/or insoluble material from other parts of the secondary side during plant operation, and especially during startup from a plant outage. The inspector established that startup procedures provide for cleanup of the condensate pipes and part of the feedwater pipes before water is allowed to flow into the OTSGs. Subsequently, high quality water is pumped forward as makeup in the OTSGs to replace water removed through blowdown, during heatup, and power ascension 'holds'. The quality of the water in the OTSGs is monitored until the plant achieves 15% power and the turbine is on line. Blowdown is not effective at higher power levels because impurities are transported to higher regions in the OTSG where they are deposited or, to the limit of their solubility in steam, are carried over to the high pressure turbine.

During steaming modes of operation, the water that collects in the moisture separator reheater (MSR) drain is cycled to the hotwell and polishers to remove potentially corrosive ions that have been concentrated through condensation of the steam in the high pressure turbine. The MSR drain water also contains more solid iron oxides than the feedwater because the Ph of this water is more acidic than the water controlled by AVT chemicals and allows more oxidation of the carbon steel pipes to occur.

The inspector considered that the licensee is taking positive measures to prevent transport of solids and corrosive ions into the OTSG even though a power penalty of 10-15 MW per unit is incurred by not cycling the water directly from the MSR forward to the feedwater pump.

d. Summary

During this part of this inspection, no violations or deviations were observed. The inspector considers that the licensee is effectively using the EPRI/SGOG guidelines and administrative controls of plant operation and secondary water chemistry to minimize transport of corrosive ions and solid iron oxides to the OTSGs.

6. Inservice Testing of Pumps and Valves (92706)

a. Implementation of the Inservice Testing (IST) Program

The inspector initiated a review and assessment of the extent to which the licensee is fulfilling the requirements of Oconee Technical Specification 4.0.4 to develop and implement a program of inspection and testing of pumps and valves that is considered to be important to safety. This review was based on discussions with plant personnel and a review of selected written procedures and instructions.

The status of the licensee's IST program was difficult to establish because, in compliance with 10 CFR 50.55(a), programs that referenced two editions of the ASME Code have been submitted to the NRC; that is, one for the first 120-month operating period (1973 or 1974 to 1983 or 1984) and the other for the second 120-month operating period beginning July 1, 1982. The initial program was approved per a Safety Evaluation Report issued by the NRC on March 25, 1982. The licensee also submitted requests for relief from specific requirements of the ASME Code, and final action on these requests has not been taken by NRC.

The inspector established that the licensee has assigned responsibilities for:

- ° Preparation, review, and approval of IST procedures
- ° Scheduling of IST tests
- ° Performing tests
- ° Calibrating test equipment
- ° Maintenance of pumps, valves, and test instrumentation
- ° Reviewing test results and assuring proper corrective action is taken, if required.

The inspector reviewed the following three test procedures that identify the valves to be tested per the IST program that is being implemented:

- ° PT/1/A/0150/22A, Operational Valve Functional Test
- ° PT/1/A/0150/22B, Shutdown Valve Functional Test
- ° PT/1/A/0150/22C, Refueling Valve Functional Test

The inspector also performed a preliminary review of the valves that are included in the IST program relative to the High Pressure Injection System and the Low Pressure Injection System, and discussed with the licensee the bases for omitting certain valves in these systems. The inspector did not make any judgements on the acceptability of these procedures or the completeness of the IST program during this inspection, but will review the implementation of the program in detail when the program has been approved by NRC.

7. Inspector Followup Items

At the conclusion of an earlier inspection (see Inspection Report Nos. 50-269/83-32, 50-270/83-32 and 50-287/83-32 dated November 25, 1983), the inspector identified two actions being taken by the licensee that

required further review and evaluation. These followup items are identified below and are hereby closed out on the basis of information obtained during the current inspection as summarized in paragraphs 5.a and 5.b of this report.

- ° Item 270/83-32-01, Review of Cleanup of the Oconee Unit 2 Once-Through-Steam-Generator
- ° Item 269, 270, 287/83-32-02, Completion and Implementation of the Oconee Chemistry Manual